Apprenticeship and Industry Training

Bricklayer

Apprenticeship Course Outline

0110 (2010)

Government of Alberta

Apprenticeship and Industry Training

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Bricklayer

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Course Outline

Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding an employer. Employers hire apprentices, pay their wages and provide on-the-job training and work experience. Approximately 80 per cent of an apprentice's time is spent on the job under the supervision of a certified journeyperson or qualified tradesperson. The other 20 per cent involves technical training provided at, or through, a post-secondary institution – usually a college or technical institute.

To become certified journeypersons, apprentices must learn theory and skills, and they must pass examinations. Requirements for certification—including the content and delivery of technical training—are developed and updated by the Alberta Apprenticeship and Industry Training Board on the recommendation of Bricklayer Provincial Apprenticeship Committee.

The graduate of the Bricklayer apprenticeship training is a journeyperson who will be able to:

- responsibly do all work tasks expected of a journeyperson
- supervise, train and coach apprentices
- produce a better quality product than the minimum acceptable by industry standard
- use and maintain tools and equipment to the standards of competency and safety required in the trade
- understand and apply the principles of sound and safe construction
- know the characteristics and proper use of masonry materials
- interpret plans and specifications, do layout work and calculate material quantities
- lay, install and repair masonry units of all materials including all types of stone
- relate to the work of other tradesperson in the construction industry
- perform assigned tasks in accordance with quality and production standards required by industry

Apprenticeship and Industry Training System

Industry-Driven

Alberta's apprenticeship and industry training system is an industry-driven system that ensures a highly skilled, internationally competitive workforce in more than 50 designated trades and occupations. This workforce supports the economic progress of Alberta and its competitive role in the global market. Industry (employers and employees) establishes training and certification standards and provides direction to the system through an industry committee network and the Alberta Apprenticeship and Industry Training Board. The Alberta government provides the legislative framework and administrative support for the apprenticeship and industry training system.

Alberta Apprenticeship and Industry Training Board

The Alberta Apprenticeship and Industry Training Board provides a leadership role in developing Alberta's highly skilled and trained workforce. The board's primary responsibility is to establish the standards and requirements for training and certification in programs under the Apprenticeship and Industry Training Act. The board also provides advice to the Minister of Advanced Education and Technology on the needs of Alberta's labour market for skilled and trained workers, and the designation of trades and occupations.

The thirteen-member board consists of a chair, eight members representing trades and four members representing other industries. There are equal numbers of employer and employee representatives.

Industry Committee Network

Alberta's apprenticeship and industry training system relies on a network of industry committees, including local and provincial apprenticeship committees in the designated trades, and occupational committees in the designated occupations. The network also includes other committees such as provisional committees that are established before the designation of a new trade or occupation comes into effect. All trade committees are composed of equal numbers of employer and employee representatives. The industry committee network is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the board can set up a local apprenticeship committee. The board appoints equal numbers of employee and employer representatives for terms of up to three years. The committee appoints a member as presiding officer. Local apprenticeship committees:

- monitor apprenticeship programs and the progress of apprentices in their trade, at the local level
- make recommendations to their trade's provincial apprenticeship committee (PAC) about apprenticeship and certification in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- make recommendations to the board about the appointment of members to their trade's PAC
- help settle certain kinds of disagreements between apprentices and their employers
- carry out functions assigned by their trade's PAC or the board

Provincial Apprenticeship Committees (PAC)

The board establishes a provincial apprenticeship committee for each trade. It appoints an equal number of employer and employee representatives, and, on the PAC's recommendation, a presiding officer - each for a maximum of two terms of up to three years. Most PACs have nine members but can have as many as twenty-one. Provincial apprenticeship committees:

- Make recommendations to the board about:
  - standards and requirements for training and certification in their trade
  - courses and examinations in their trade
  - apprenticeship and certification
  - designation of trades and occupations
  - regulations and orders under the Apprenticeship and Industry Training Act
- monitor the activities of local apprenticeship committees in their trade
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- consult with other committees under the Apprenticeship and Industry Training Act about apprenticeship programs, training and certification and facilitate cooperation between different trades and occupations
- consult with organizations, associations and people who have an interest in their trade and with employers and employees in their trade
- may participate in resolving certain disagreements between employers and employees
- carry out functions assigned by the board

Bricklayer PAC Members

Mr. C. Ambrozic	Edmonton	Presiding Officer
Mr. K. Gowerluk	Calgary	Employer
Mr. W. Pruden	Calgary	Employer
Mr. M. Weinmeier	Edmonton	Employer
Mr. M. Caforio	Edmonton	Employee
Mr. P. Lemke	Edmonton	Employee
Mr. L. MacPherson	Calgary	Employee

Alberta Government

Alberta Advanced Education and Technology works with industry, employer and employee organizations and technical training providers to:

- facilitate industry's development and maintenance of training and certification standards
- provide registration and counselling services to apprentices and employers
- coordinate technical training in collaboration with training providers
- certify apprentices and others who meet industry standards

Technical Institutes and Colleges

The technical institutes and colleges are key participants in Alberta's apprenticeship and industry training system. They work with the board, industry committees and Alberta Advanced Education and Technology to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs. They develop lesson plans from the course outlines established by industry and provide technical training to apprentices.

Apprenticeship Safety

Safe working procedures and conditions, incident/injury prevention, and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees, apprentices and the public. Therefore, it is imperative that all parties are aware of circumstances that may lead to injury or harm.

Safe learning experiences and healthy environments can be created by controlling the variables and behaviours that may contribute to or cause an incident or injury. By practicing a safe and healthy attitude, everyone can enjoy the benefit of an incident and injury free environment.

Alberta Apprenticeship and Industry Training Board Safety Policy

The Alberta Apprenticeship and Industry Training Board fully supports safe learning and working environments and encourages the teaching of proper safety procedures both within trade specific training and in the workplace.

Trade specific safety training is an integral component of technical training, while ongoing or general non-trade specific safety training remains the responsibility of the employer and the employee as required under workplace health and safety legislation.

Workplace Responsibilities

The employer is responsible for:

- training employees and apprentices in the safe use and operation of equipment
- providing and maintaining safety equipment, protective devices and clothing
- enforcing safe working procedures
- providing safeguards for machinery, equipment and tools
- observing all accident prevention regulations

The employee and apprentice are responsible for:

- working in accordance with the safety regulations pertaining to the job environment
- working in such a way as not to endanger themselves, fellow employees or apprentices

Workplace Health and Safety

A tradesperson is often exposed to more hazards than any other person in the work force and therefore should be familiar with and apply the Occupational Health and Safety Act, Regulations and Code when dealing with personal safety and the special safety rules that apply to all daily tasks.

Workplace Health and Safety (Alberta Employment, Immigration and Industry) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.worksafely.org

Technical Training

Apprenticeship technical training is delivered by the technical institutes and many colleges in the public post-secondary system throughout Alberta. The colleges and institutes are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All training providers place great emphasis on safe technical practices that complement safe workplace practices and help to develop a skilled, safe workforce.

The following institutions deliver Bricklayer apprenticeship technical training:

SAIT Edmonton
SAIT Calgary

Procedures for Recommending Revisions to the Course Outline

Advanced Education and Technology has prepared this course outline in partnership with the Bricklayer Provincial Apprenticeship Committee.

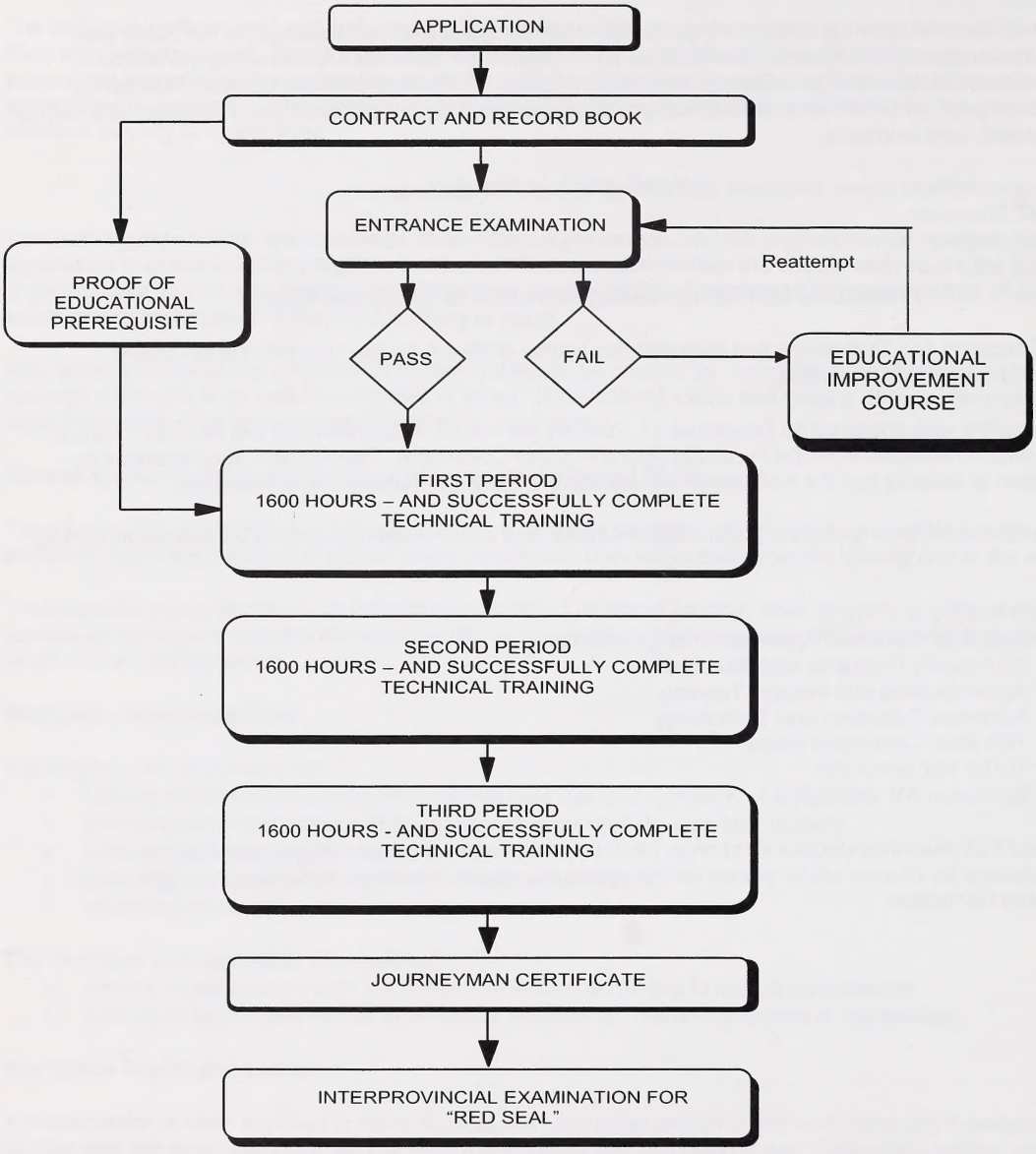
This course outline was approved on December 11, 2009 by the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. The valuable input provided by representatives of industry and the institutions that provide the technical training is acknowledged.

Any concerned individual or group in the province of Alberta may make recommendations for change by writing to:

Bricklayer Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
Advanced Education and Technology
10th floor, Commerce Place
10155 102 Street NW
Edmonton AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations for change will be placed on the agenda for regular meetings of the Bricklayer Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification



Bricklayer Training Profile

FIRST PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

OCCUPATIONAL SKILLS ONE
40 HOURS

A	B	C
Bricklayer Apprenticeship Program Orientation 3 Hours	Work Site Safety 5 Hours	Math One 16 Hours

D
Blueprint One 16 Hours

SECTION TWO

TOOLS AND EQUIPMENT
32 HOURS

A	B	C
Measuring and Layout Tools 6 Hours	Cutting Tools and Equipment 7 Hours	Trowels and Finishing Tools 7 Hours

D	E	F
Mixing and Material Handling Tools and Equipment 3 Hours	Power Hand Tools 3 Hours	Explosive Actuated Tools 6 Hours

SECTION THREE

MASONRY MATERIALS
30 HOURS

A	B	C
Clay Brick 12 Hours	Concrete Block 12 Hours	Mortars, Grout and Concrete 6 Hours

SECTION FOUR

LAYOUTS AND PROCEDURES
70 HOURS

A	B	C
Laying Masonry Units 31 Hours	Masonry Bond Patterns 15 Hours	Masonry Wall Elements 21 Hours

D
Cleaning New Masonry 3 Hours

SECTION FIVE

MASONRY ASSEMBLIES ONE
68 HOURS

A	B	C
Brick Projects 27 Hours	Refractory One 11 Hours	Composite Walls 27 Hours

D
Scaffolding Erection 3 Hours

Bricklayer Training Profile
SECOND PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

OCCUPATIONAL SKILLS TWO
33 HOURS

A	B	C
Blueprint Two 13 Hours	Math Two 13 Hours	Workplace Coaching Skills 5 Hours

D
Advisory Network 2 Hours

SECTION TWO

WALL SYSTEM DESIGN
30 HOURS

A	B	C
Masonry Insulation 4 Hours	Moisture Control 10 Hours	Movement Control 4 Hours

D
Load Bearing and Non-Load Bearing Walls 12 Hours

SECTION THREE

CONCRETE BLOCK CONSTRUCTION
45 HOURS

A	B
Foundation Walls 5 Hours	Reinforced Grouted Masonry Walls 40 Hours

SECTION FOUR

ABOVE GRADE MASONRY
72 HOURS

A	B
Cavity Walls 40 Hours	Veneer Walls 32 Hours

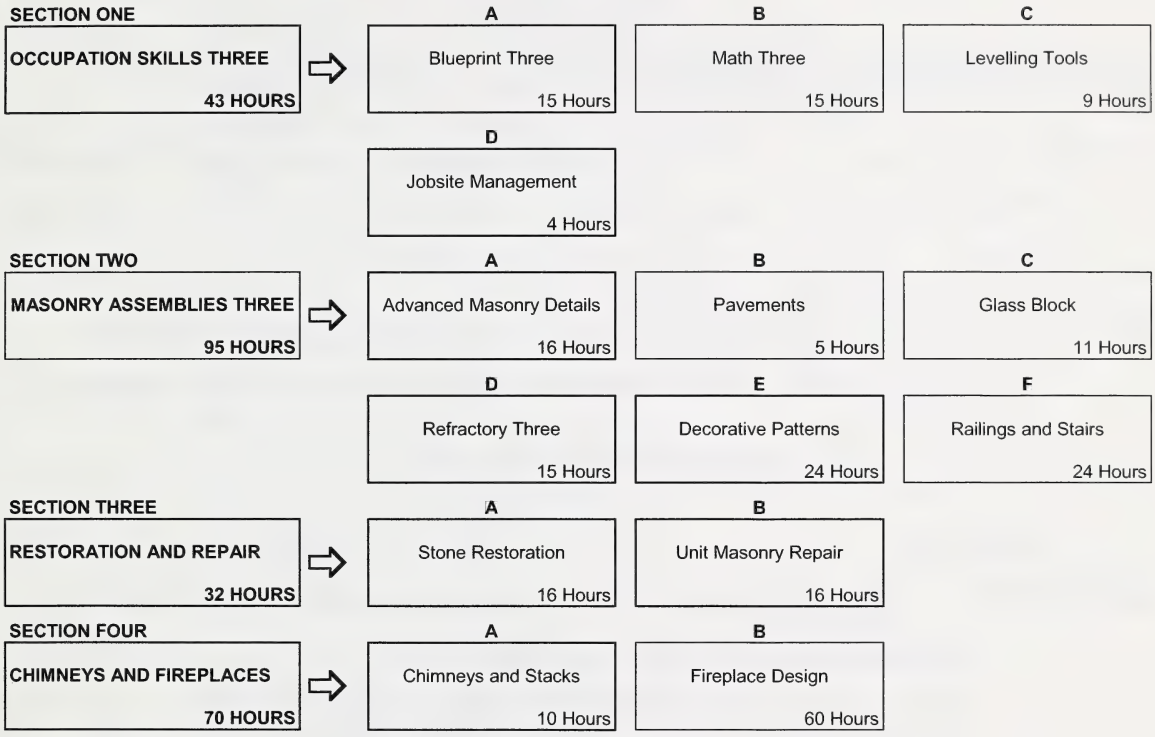
SECTION FIVE

MASONRY ASSEMBLIES TWO
60 HOURS

A	B	C
Stone Masonry 16 Hours	Pre-Fabricated Masonry Panels 2 Hours	Masonry Arches 33 Hours

D
Refractory Two 9 Hours

Bricklayer Training Profile
THIRD PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)



NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

FIRST PERIOD TECHNICAL TRAINING
BRICKLAYER TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: ..... OCCUPATIONAL SKILLS ONE ..... 40 HOURS

A. Bricklayer Apprenticeship Program Orientation .....3 Hours

Outcome: ***Describe the scope and function of Bricklayer apprenticeship training.***

1. Describe the apprenticeship training system in Alberta.
2. Explain the Bricklayer course outline learning outcomes and objectives.
3. Identify residential, commercial, and industrial fields that provide employment opportunities for Bricklayers.
4. Identify the authorities that regulate the masonry trade.
5. Describe historical events that contributed to the trade.

B. Work Site Safety.....5 Hours

Outcome: ***Recognize Occupational Health and Safety Regulations and safe work practices in the workplace.***

1. Interpret Occupational Health and Safety regulations.
2. Describe the safe and proper use of personal protective equipment.
3. Describe emergency procedures for dealing with injured workers.
4. Identify potential health safety hazards and related work practices.
5. Describe the safe use of various types of ladders scaffolds.
6. Describe procedures and equipment related to preventing, detecting and warning of fires.

C. Math One.....16 Hours

Outcome: ***Perform basic calculations related to masonry construction.***

1. Use a calculator and apply basic math concepts to solve trade-related math problems in both the metric and imperial systems of measurement.
2. Determine the perimeter and centreline perimeter for various masonry projects and buildings.
3. Determine the area and volume for various shapes and objects.
4. Solve trade related problems involving ratio and proportion, mechanical advantage and percentage.
5. Calculate masonry material quantities from residential and commercial blueprints.

D. Blueprint One ..... 16 Hours

Outcome: ***Interpret blueprints and related documents.***

1. Recognize the types of drawings used by construction trades.
2. Define the language of blueprints (scale, line types, symbols, dimensioning standards, abbreviations).
3. Recognize the views of a blueprint.
4. Interpret masonry information from blueprints.
5. Sketch objects in various views.

SECTION TWO: ..... TOOLS AND EQUIPMENT ..... 32 HOURS

A. Measuring and Layout Tools ..... 6 Hours

Outcome: ***Identify measuring and layout tools.***

1. Describe the use of lines and measuring tools.
2. Describe the use of various squares and related layout tools.
3. Describe the use of spirit levels.
4. Use measuring and layout tools.

B. Cutting Tools and Equipment ..... 7 Hours

Outcome: ***Identify the tools and equipment used to cut masonry materials***

1. Describe the safe use of hammers and chisels.
2. Describe the safe use of masonry saws.
3. Cut masonry units with hammers and chisels.
4. Choose blades for and use masonry saws.

C. Trowels and Finishing Tools ..... 7 Hours

Outcome: ***Identify the tools used to spread and finish mortar, grout and concrete.***

1. Describe the use of brick trowels.
2. Describe the use of jointers and tuck pointers.
3. Use trowels to spread mortar for head and bed joints.
4. Finish mortar joints with round jointers, rakers and flat jointers.

D. Mixing and Material Handling Tools and Equipment ..... 3 Hours

Outcome: ***Identify the tools and equipment used to mix mortar and grout and to move material.***

1. Describe the tools to mix mortar by hand.
2. Describe the safe use of the paddle and mud mixers.
3. Describe the safe use of hoists and forklifts.
4. Mix mortar using hand tools and power mixing equipment.

E. Power Hand Tools ..... 3 Hours

Outcome: ***Describe the safe operation of power hand tools.***

1. Describe the operation of electric drills and hammer drills.
2. Describe the safe operation of power handsaws.
3. Describe the safe use of angle grinders and tuck-pointer's grinders.
4. Demonstrate the safe use power hand tools.

F. Explosive Actuated Tools ..... 6 Hours

Outcome: ***Describe the safe operation of explosive actuated tools.***

1. Describe explosive actuate tool power loads, power load strength and safety.
2. Describe explosive actuated tool fasteners, accessories and applications.
3. Assess base material suitability and related fastening requirements.
4. Perform tool maintenance and use an explosive actuated tools.

SECTION THREE: ..... MASONRY MATERIALS ..... 30 HOURS

A. Clay Brick ..... 12 Hours

Outcome: ***Describe clay brick materials.***

1. Relate the steps involved in the manufacturing of brick.
2. Describe the uses for various brick shapes.
3. List the actual and nominal sizes for commonly used bricks.
4. Describe the physical and aesthetic characteristics of bricks.
5. Detail the use of salvaged bricks.

B. Concrete Block ..... 12 Hours

Outcome: ***Describe concrete block materials.***

1. Relate the steps involved in the manufacturing of concrete blocks.
2. Describe the uses for various concrete block shapes.
3. List the actual and nominal sizes for commonly used concrete blocks.
4. Describe the physical and aesthetic characteristics of concrete blocks.

C. Mortars, Grouts, and Concrete ..... 6 Hours

Outcome: ***Describe the production and uses for masonry mortars, grouts, and concrete in masonry structures.***

1. Describe the mortar used for masonry construction.
2. Describe the use of masonry grout.
3. Describe the uses for concrete in masonry construction.

SECTION FOUR: ..... LAYOUT AND PROCEDURES ..... 70 HOURS

A. Laying Masonry Units ..... 31 Hours

Outcome: ***Describe the procedures used to lay bricks and concrete blocks.***

1. Describe the procedures for applying mortar to masonry units.
2. Describe the procedures for positioning bricks and blocks on a wall.
3. Describe the procedures for forming mortar joints.
4. Describe the procedures for laying to the line.
5. Construct brick and concrete block leads.
6. Construct masonry walls.

B. Masonry Bond Patterns ..... 15 Hours

Outcome: ***Describe structural bond patterns for masonry.***

1. Describe brick positions.
2. Describe running bond and stack pattern.
3. Describe structural bond patterns for multi-wythe brick walls.

C. Masonry Wall Elements ..... 21 Hours

Outcome: ***Describe building components and elements that are incorporated in masonry walls.***

1. Describe the construction of masonry openings.
2. Describe the construction of chases and recesses in walls.
3. Describe the inclusion of electrical and mechanical components in walls.
4. Describe corbelling and battering.
5. Construct masonry columns.

D. Cleaning New Masonry ..... 3 Hours

Outcome: ***Describe the methods used to clean new masonry.***

1. Describe the use of acids and cleaners for masonry walls.
2. Demonstrate the safe use of acids and cleaners for masonry walls.

SECTION FIVE: ..... MASONRY ASSEMBLIES ONE ..... 68 HOURS

A. Brick Projects ..... 27 Hours

Outcome: ***Construct various brick projects.***

1. Construct projects that incorporate rowlocks, soldiers and mitres.
2. Construct multi-wythe walls in running, American, English, and Flemish bonds.

B. Refractory One ..... 11 Hours

Outcome: ***Describe the components of refractory systems.***

1. Define refractory safety procedures.
2. Describe refractory materials.

C. Composite Walls ..... 27 Hours

Outcome: ***Construct composite walls.***

1. Construct solid and composite brick and block walls.
2. Construct walls that include electrical and mechanical components.
3. Construct walls with openings.

D. Scaffolding Erection ..... 3 Hours

Outcome: ***Erect and use frame scaffolding.***

1. Prepare surfaces for scaffolds.
2. Erect, inspect and load scaffolds.
3. Dismantle scaffolds.

SECOND PERIOD TECHNICAL TRAINING
BRICKLAYER TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: OCCUPATIONAL SKILLS TWO ..... 33 HOURS

A. Blueprint Two ..... 13 Hours

Outcome: Interpret small building blueprints.

1. Interpret architectural plans.
2. Interpret information from schedules.
3. Interpret masonry specifications.
4. Sketch and dimension shop projects.

B. Math Two ..... 13 Hours

Outcome: Solve masonry related quantities.

1. Determine material quantities from blueprints.
2. Calculate quantities for mechanical fasteners.
3. Calculate quantities for rebar and grout fill.
4. Determine stone quantities.
5. Calculate arch geometries.

C. Workplace Coaching Skills ..... 5 Hours

Outcome: Display coaching skills.

1. Describe coaching skills used for training apprentices.

D. Advisory Network ..... 2 Hours

Outcome: Describe the advisory network.

1. Explain the role and purpose of the advisory network, local apprenticeship committee's and provincial apprenticeship committees.

SECTION TWO: WALL SYSTEM DESIGN ..... 30 HOURS

A. Masonry Insulation ..... 4 Hours

Outcome: Describe the use of insulation to control heat loss in masonry structures.

1. Describe the function, type, and RSI value of insulation.
2. Describe the placement of insulation in masonry.

B. Moisture Control ..... 10 Hours

Outcome: ***Describe methods used to control the movement of moisture in masonry.***

1. Describe the function, material and placement of air-vapour barriers.
2. Describe the function of flashing in masonry.
3. Describe the use of weep holes and vents in masonry walls.
4. Describe the use of masonry membranes.

C. Movement Control ..... 4 Hours

Outcome: ***Describe the use of expansion and crack control joints in masonry.***

1. Describe the stresses to which masonry is subject.
2. Describe the function of expansion joints in masonry walls.
3. Describe the function of crack control joints in masonry walls.
4. Install control joints.

D. Loadbearing and Non-loadbearing Walls ..... 12 Hours

Outcome: ***Describe the effect of wall design of masonry to carry load.***

1. Describe the function of non-load bearing walls.
2. Describe the design of non-load bearing walls.
3. Describe the function of load bearing walls.
4. Describe the design of load bearing walls.

SECTION THREE: ..... CONCRETE BLOCK CONSTRUCTION ..... 45 HOURS

A. Foundation Walls ..... 5 Hours

Outcome: ***Describe the construction of masonry foundation walls.***

1. Describe footings for foundation walls.
2. List the materials used to construct foundation walls.
3. Describe the procedures for parging and waterproofing foundations.

B. Reinforced Grouted Masonry Walls ..... 40 Hours

Outcome: ***Describe the construction of above grade reinforced grouted masonry (RGM) walls.***

1. Describe the footing for RGM walls.
2. Describe the placement of reinforcing wire, rebar, and grout.
3. Describe the installation of metal door and window frames.
4. Describe the placement of insulation in RGM walls.
5. Describe high lift grouting in reinforced block walls.
6. Describe low lift grouting.
7. Construct reinforced grouted masonry walls.

SECTION FOUR: ..... ABOVE GRADE MASONRY ..... 72 HOURS

A. Cavity Walls ..... 40 Hours

Outcome: ***Describe the construction of cavity walls.***

1. Describe the bearing support for cavity walls.
2. Describe the procedures for controlling the movement of moisture in cavity walls.
3. Describe the placement of insulation within cavity wall construction.
4. Describe the placement of ties and anchors in cavity walls.
5. Describe the loading capacities and locations for cavity walls.
6. Construct cavity walls.

B. Veneer Walls ..... 32 Hours

Outcome: ***Describe the construction of masonry veneer walls.***

1. Describe the bearing support for veneer walls.
2. Describe the procedures for controlling the movement of moisture in veneer walls.
3. Describe the placement of insulation within veneer walls.
4. Describe the installation of ties and anchors in veneer walls.

SECTION FIVE: ..... MASONRY ASSEMBLIES TWO ..... 60 HOURS

A. Stone Masonry ..... 16 Hours

Outcome: ***Describe natural stone installations.***

1. Describe stone types.
2. Describe the mortars used for stone.
3. Describe the layout and patterns for stone.
4. Describe the various procedures for setting stone.
5. Describe the installation of stone cladding.

B. Pre-fabricated Masonry Panels ..... 2 Hours

Outcome: ***Describe the use of prefabricated masonry panels.***

1. Describe the methods used to assemble prefabricated masonry panels.
2. Describe the placement of prefabricated masonry panels.

C. Masonry Arches ..... 33 Hours

Outcome: ***Describe the most commonly constructed masonry arches.***

1. Describe the various types of arches.
2. Describe arch layout procedures.
3. Describe arch load factors.
4. Construct arch centres.
5. Construct masonry arches.

D. Refractory Two.....9 Hours

Outcome: ***Describe the procedures used to assemble refractory systems.***

1. Describe the installation procedures for refractories.
2. Describe refractory anchors.
3. Identify materials required for tear out within a refractory system.

THIRD PERIOD TECHNICAL TRAINING
BRICKLAYER TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... OCCUPATIONAL SKILLS THREE ..... 43 HOURS

A. Blueprint Three ..... 15 Hours

Outcome: ***Interpret commercial blueprints.***

1. Interpret architectural plans.
2. Define masonry elements in structural plans.
3. Locate and identify masonry details.
4. Locate non-masonry components.
5. Sketch masonry details to clarify construction drawings.
6. Describe Leed requirements.

B. Math Three..... 15 Hours

Outcome: ***Calculate masonry quantities and manpower needs for masonry projects.***

1. Calculate gauge and slope.
2. Calculate the amount of materials.
3. Calculate the manpower as it relates to masonry projects.
4. Finalize the cost of masonry projects.

C. Leveling Tools..... 9 Hours

Outcome: ***Set up and use various types of levels.***

1. Set up a builder's level and prepare it for operation.
2. Set up a laser level and prepare it for operation.
3. Demonstrate the ability to lay out story poles.

D. Jobsite Management ..... 4 Hours

Outcome: ***Describe jobsite preparation.***

1. Determine material storage and mortar mixing areas.
2. Describe procedures for hot and cold weather conditions.
3. Describe methods for bracing and shoring walls.

SECTION TWO: MASONRY ASSEMBILIES THREE 95 HOURS

A. Advanced Masonry Details 16 Hours

Outcome: ***Describe the design of advanced masonry details.***

1. Describe the layout of Serpentine masonry projects.
2. Describe masonry quoins.
3. Describe corbelling and battering.
4. Construct project that incorporate masonry details.

B. Pavements 5 Hours

Outcome: ***Describe the use of pavers and flagstone.***

1. Describe the installation of dry set brick pavers.
2. Describe the installation of mortared brick pavers.
3. Describe the installation of flagstone.
4. Install brick pavers.

C. Glass Block 11 Hours

Outcome: ***Describe the use of Glass Block.***

1. List the types and sizes of glass block.
2. Describe the mortar mixes used with glass block.
3. Describe glass block reinforcements.
4. Install a glass block panel.

D. Refractory Three 15 Hours

Outcome: ***Describe the performance of refractory installations.***

1. Describe the use of control and expansion joints in refractories.
2. Describe the curing and thermal drying of refractory systems.
3. Identify destructive service factors of refractories.
4. Describe refractory inspection and repair processes.
5. Install various types of refractories.

E. Decorative Patterns 24 Hours

Outcome: ***Describe decorative masonry patterns.***

1. Describe colours and textures in masonry materials.
2. Describe decorative patterns in masonry.
3. Describe the use of brick slices.
4. Construct projects using various decorative patterns.

F. Railings and Stairs 24 Hours

Outcome: ***Describe the construction of stairs and railings.***

1. Calculate the rise and run of masonry stairs.

2. Describe the layout procedures for constructing steps.
3. Describe the rail/ cheek wall layout procedures.
4. Construct a set of brick stairs.

SECTION THREE: ..... RESTORATION AND REPAIR ..... 32 HOURS

A. Stone Restoration ..... 16 Hours

Outcome: ***Describe the restoration of natural stone installations.***

1. Describe the causes of deterioration of stone.
2. Describe the methods used to match mortar colours used for stone.
3. Describe the methods used to remove stains from stone masonry.
4. Describe the procedure for replacing and repointing stone.
5. Discuss *jahn* injection repair.

B. Unit Masonry Repair ..... 16 Hours

Outcome: ***Describe procedures to repair unit masonry walls.***

1. Describe the causes of deterioration of masonry structures.
2. Describe the replacement and repointing methods for masonry walls.
3. Describe the repair and replacement of masonry flashings.
4. Describe the methods for sealing and re-caulking existing masonry.
5. Describe the methods for removing stains from brick and block.

SECTION FOUR: ..... CHIMNEYS AND FIREPLACES ..... 70 HOURS

A. Chimneys and Stacks ..... 10 Hours

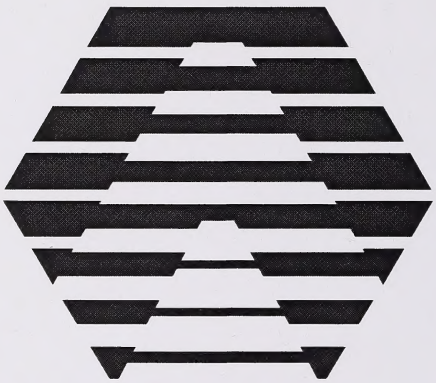
Outcome: ***Describe masonry chimneys and stacks.***

1. Classify chimney types.
2. Describe the principles of chimney design.
3. List the parts of a chimney.
4. Describe the construction of masonry chimneys.
5. Describe the requirements for protection of combustibles around wood stoves.

B. Fireplace Design ..... 60 Hours

Outcome: ***Describe masonry fireplaces.***

1. Describe design variations for fireplaces.
2. Describe the function of the parts of a fireplace.
3. Relate the codes that apply to fireplace construction.
4. List the materials used to build a masonry fireplace.
5. Describe the installation procedures for a fireplace.
6. Build a masonry fireplace.



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